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Proposed system of forecasting the best spray date against barley mildew using MWR data

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It appears possible that the optimum single spray date is close to the time when the second big release of spores occurs after the disease has first appeared in the crop. This release depends on the weather, being greatest when temperatures are high, winds are strong and sunshine hours are long.

An index, based on MWR data, was therefore used, namely $3T + \frac{1}{2}W + H$

where T = day max temp in ^{o}C
W = 1200h wind speed in knots
H = hours of sunshine
(the effect of rain was ignored except in that H would be likely to be low)

The critical value for this index was taken to be 65.
The most rapid increase of spore release appears to be likely if the time between suitable weather periods is equal to the incubation period of the fungus, (say 5-10 days).
There may be some advantage in selecting a high index day for spraying (underlined).

1971 Analysis

(a) Honington

Weather indices:- May 3-6, 8-13, 18-21, May 31-June 3, June 11, 22-28.

At Boxworth, winter barley 200 yds, mildew was reported present on May 18. The index days May 21 and 31 appear significant. Estimated best dates June 1 or 2
The best spray date was June 9, the next best June 1.

At Morley, winter barley was adjacent. The index days 3-13 appear significant.
Estimated best date May 14 or 15; May 18
The best spray date was May 17.

(b) Ross

Weather indices:- May 3-7, 13-14, 18-22, June 1-4, 22-24 or 26-28.

At Rosemaund mildew was reported present on May 13. The index days May 14 & 22 or May 22-June 1 appear significant. Estimated best spray dates May 23 or 24, alternatively June 2 or 3.
The best spray date was June 10; next best May 27.

(c) Filton

Weather indices:- May 4-6, 11-14, 18-22, 24, May 31-June 4, June 20, 22-24.

At Almonsbury, no winter barley, mildew was reported present on May 17. The index days 18 & 24 are possibly significant, but May 21 & 31 are more likely. Estimated best spray dates June 1 or 2.
The best spray date was June 16; the next best were 12 May and 2 June.

(d) Wittering

Weather indices:- May 4-6, 8-11, 13-14, 18-21, June 1-3, 22-28.
At Wellesbourne, winter barley adjacent, mildew was reported on April 27. The index days May 4 and 13/14 appear significant. Estimated best spray dates May 15 or 16, alternatively May 18-21.
The best spray date was May 17.

At Gleedthorpe, winter barley 200 yds, mildew was reported on April 28. Estimations similar.
The best spray date was May 11, next best May 18.

At Osgathorpe, no winter barley, mildew was reported on May 21.
The index days May 21 & 31 appear significant. Estimated best spray dates June 1 or 2.
The best spray date was May 25, next best June 2.

(e) Leeming

Weather indices:- May 3-6, 9-11, 13-14, 18-19, May 21, June 1-3, 22, 24.

At Balne, winter barley $\frac{1}{4}$ mile, mildew was reported on May 4.
The index days May 9-11 and 18-19 appear significant. Estimated spray dates May 20 and 21.
The best spray date was June 2, next best May 21.

High Mowthorpe is higher than Leeming, so using indices over 70:-

Weather indices: May 4-6, 11, 21, June 1-2, 22.

At High Mowthorpe, no winter barley, mildew was reported on May 15. The index days May 21 and June 1 appear significant. Estimated best spray dates June 2 and 3rd. The best spray date was June 4.

(f) Carlisle

Weather indices:- May 4-6, 10, 12-14, 21-22, June 1-4, 22.

At Penrith, no winter barley, mildew was reported on May 19.
The index days May 21-22 and June 1 appear significant. Estimated best spray dates June 2 or 3.
The best spray date was June 1.

1972 Analysis

(a) Honington

Weather indices:- May 1-3, 8, 22-23, 25-26, June 6-8, 14, 16-17, 19, 22-23.

At Boxworth, winter barley 300 yds, mildew was reported on May 16.
The index days May 26 & June 6 appear significant. Estimated best spray dates June 7, 8.
The best spray date was June 13.

(b) Ross

Weather indices:- May 1, June 14, 16, 19, 26, 30.

At Rosemaund, winter barley 500 yds, mildew was reported on May 9.
The index days June 14 & 19 appear significant. Estimated best spray dates June 20 or 21.
The best spray date was June 20.

(c) Filton

Weather indices:- May 1, June 5, 14, 17, 19, 28, 30.

At Chipping Sodbury, winter barley ½ mile, mildew was reported on May 18.
The index days June 5 & 14 appear significant. Estimated best spray date June 15 or 16.
The best spray date was June 7; the next best June 14.

At Old Sodbury, winter barley adjacent, mildew was reported on May 25.
Estimates as above.
The best spray dates were 21 June, the next best June 14.

(d) Wittering

Weather indices:- May 1, 3, 19-20, June 5-6, 14, 28, 30.

At Wellesbourne, winter barley 200 yds, mildew was reported on May 15.
The index days May 20, June 5 or 6 appear significant (double inoculation interval). The estimated best spray dates were June 6-7.
The best spray date was June 5.

At Gleedthorpe, winter barley ¼ mile, mildew was reported on May 10.
Estimates as above.
The best spray date was May 17, the next best was May 31. The June 7 spray was third best (110% of untreated control).

(e) Leeming

Weather indices:- May 1, 20, 23, 25, June 1, 5-6, 14, 16, 21, 28-30.

At Henshall, winter barley adjacent, mildew was reported on May 8.
The double incubation period May 1-20 (with a near miss on the 10th) might have been significant.
Estimated spray dates May 23 or 24.
The best spray date was May 8, the next best 18 May.

At Aberford, winter barley ¼ mile, mildew was reported on May 8.
Estimates as above.
Best spray date June 6, next best May 26.

Weather indices (70 threshold):- May 1, 20, 23, June 6, 16, 28, 30.

At High Mowthorpe, no winter barley, mildew was reported on June 2.
The index days June 6 & 16 appear significant.
Estimated best spray dates June 17 or 18.
The best spray date was June 15.

(f) Carlisle

Weather indices:- May 20, June 13-14, June 30.

At Culthwaite, no winter barley, mildew was reported on June 5.
The index days June 13/14 and June 30 appear significant (double incubation period with a near miss on the 21st).
Estimated best spray dates July 1 or 2.
The best spray date 30 June.

Conclusions

Using readily available meteorological data, it seems possible to formulate a procedure whereby a best spray date can be nominated which is likely to be either the actual best date or the next best. The desirable weather on the day of spraying is still to be determined. There is evidence that although the disease may be controlled, the yield may be depressed more than might be expected. The quoted "best day" and "next best" days may therefore need some qualification.

Any comments or suggestions on this paper should be referred to the author.

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